

# 15 Summary of Significant Effects

## Introduction

- 15.1 Chapters **6 to 14** of the Environmental Statement (ES) report the findings of the assessments of the predicted effects of the Development on a topic-by-topic basis. The significance of these effects has been assessed using criteria defined in the topic chapters. Where appropriate, the significance of effects has been categorised as major, moderate, minor or negligible. In the context of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) ('the EIA Regulations')<sup>i</sup>, effects assessed as being of '**major**' or '**moderate**' significance are considered to be significant effects. An exception to this is in **Chapter 11: Noise** where effects are either considered to be **significant** or **not significant** in the context of the EIA Regulations. Moreover, the assessment of potential effects on aviation, defence, dust and telecommunications operations in **Chapter 14: Other Issues** considers technical acceptability rather than following a strict EIA process of assessing the significance of effects.
- 15.2 In line with Schedule 4 of the EIA Regulations, PAN 1/2013<sup>ii</sup>, and other relevant EIA guidance, the ES has focused particularly on significant effects (both positive and negative).
- 15.3 **Table 15.1** summarises the predicted significant effects of the Development prior to, and following, the implementation of committed mitigation measures.

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- 15.4 Prior to committed mitigation, significant effects are predicted in relation to:
- Landscape and Visual Amenity;
  - Hydrology, Hydrogeology, Geology and Soils;
  - Ornithology;
  - Cultural Heritage;
  - Socio-Economics, Tourism and Recreation; and
  - Other Issues.
- 15.5 No significant effects are predicted in relation to:
- Ecology;
  - Noise; and
  - Access, Traffic and Transport.
- 15.6 Only effects which are considered to be significant prior to mitigation are presented in **Table 15.1**. All other effects are considered to be non-significant prior to mitigation and are therefore not presented.
- 15.7 The design strategy for the Development has been landscape led and has focussed on creating a layout composition relating to the landscape, landform and scale. Therefore, overall, the aim of the design strategy was to create a windfarm with a cohesive design that relates to the surrounding landscape in line with appropriate published guidance<sup>iii</sup>. The inherent nature of wind turbines as tall, modern structures means that the form of the Development as a whole is important, and a clear design strategy is necessary. The strategy therefore considered the appearance of the Development as an object or composition in the landscape as an important factor in developing the layout.
- 15.8 The key site specific design objectives applied during the iterative design process have been to relate the scale of the Development to the scale of the landscape; to improve the appearance of the Development when seen in the wider landscape including from Wanlockhead, Sanquhar, Nithsdale, and the B740, to increase setback from the Southern Upland Way (SUW), and to consider the wider cumulative scenario and reduce the overall visibility of the Development with other schemes from key viewpoints.

- 15.9 The main components of the Development considered in the design iterations were the turbines. Infrastructure features such as onsite access tracks, construction compounds and borrow pits, being less visible beyond approximately 10km and limited to locations where elevated views across the Development Area are possible, were designed around onsite environmental constraints. Further minor iterations to the turbine layout were explored following detailed engineering review.
- 15.10 Design changes made as a consequence of the key constraints to site design are considered to be mitigation which is 'embedded' in the design. Further details of the design strategy and the technical and environmental constraints that have informed the design can be found in ES **Chapter 3: Site Selection and Design Strategy**, and a summary of the design layout modifications is shown in **Figure 3.1**.
- 15.11 As shown in **Table 15.1**, there is scope to mitigate most of the predicted significant effects and many are therefore not significant following mitigation. An exception is landscape and visual effects and cultural heritage setting effects. Mitigation for landscape and visual effects has been a key component of the design process for the Development, and as such, no additional mitigation measures are proposed. **Table 15.1** therefore summarises the residual landscape and visual effects of the Development.

## Landscape and Visual Amenity

- 15.12 The Development Area is currently upland moorland used predominantly for grazing, although there are areas of forest plantations. Construction activities will therefore temporarily change the moorland to a construction site with excavations, forest felling and track construction, two site accesses and five working construction compounds, the gradual introduction of ground level infrastructure elements and the increasing presence of tall cranes and partially built towers, whilst turbines are erected. Significant (**major**) landscape and visual effects are predicted to occur for the Development Area during the construction period, which is anticipated to last two years.
- 15.13 The landscapes and viewpoints close to the Development Area, from where ground conditions will be discernible, will experience a large scale of change, although this will be short term and relatively localised. Receptors will include the host landscape of the Development Area (landscape effects on the Southern Uplands unit) and local people and walkers on the SUW as it passes through the Development Area (visual effects). Effects on landscape or on views seen from outside the Development Area will be more distant and will not be significant during construction.
- 15.14 The sources of landscape and visual effects that will occur during the operational phase of the Development, with a lifespan of 25 years, will include the introduction of turbines and ground level infrastructure elements. Significant effects on landscape character are not considered likely to occur beyond 15km away given the limited visibility of the Development from these areas. Significant landscape effects are considered likely for parts of the Southern Uplands LCT, the Upland Glens LCT, the Upland River Valley LCT and the Upper Dale LCT. Significant cumulative effects are also predicted on parts of the Upland River Valley and Upper Dale LCTs.
- 15.15 The visual amenity assessment considered views from static viewpoints, settlements and routes and paths within the landscape. Significant effects on views and visual amenity are predicted to occur in the vicinity of the Development Area up to to approximately 12.5km from the proposed turbines, with higher sensitivity receptors comprising residents in local settlements and people using recreational routes e.g. the SUW.
- 15.16 Significant visual effects are predicted from the settlement of Wanlockhead, sections of the A76 (including cumulatively with other developments), B797 and B740 roads, and also sections of the SUW, Coffin Road and the Muirkirk to Wanlockhead Drove Road. Significant visual effects are predicted for 14 of the 24 representative viewpoints. Of these, Lowther Hill (VP6), Crawick Multiverse (VP10) and the B740 at Crawfordjohn (VP13) are predicted to have significant cumulative effects with other developments.
- 15.17 The residential visual amenity assessment considered the effects of the Development on the visual aspects of residential amenity from properties within approximately 2-2.5km of the Development. Of the 16 properties, or groups of properties, that were assessed, only Clackleith which is located within the Development Area approximately 500m from a turbine, was found to result in the property becoming an 'unattractive place to live'. However, this property is currently uninhabitable, is owned by Buccleuch Estates and will not be brought into residential use during the lifetime of the Development.

15.18 The extent of the landscape and visual effects identified as significant in the context of the EIA regulations, are considered to be within the range of effects that can be expected from a development of this type and size.

#### Hydrology, Hydrogeology, Geology and Soils

15.19 During construction of the Development **moderate** (significant) effects are predicted in relation to the mobilisation of heavy metals resulting in elevated metal levels in surface water quality. A **moderate** (significant) effect is also predicted on surface water quality during construction due to a potential peat stability failure causing sedimentation of watercourses.

15.20 In addition to the good practice measures, site specific mitigation is proposed, including further pre-construction soil and water sampling and construction sampling and monitoring, detailed drainage design to control run-off, environmental supervision during construction and geotechnical investigation at specific locations which reduce the significance of the residual effects on water quality to **minor** (not significant).

#### Ornithology

15.21 During construction of the Development and in the absence of mitigation, it is predicted that there will be moderate (significant) effects on black grouse, hen harrier, merlin and short-eared owl as a result of potential disturbance or habitat loss. Implementation of mitigation measures including a 'Breeding Bird Protection Plan', pre-construction surveys and application of a 'construction buffer' from sensitive locations during specific times/dates, reduce the effects on these species to **minor** (not significant).

15.22 No significant effects are predicted during operation or cumulatively with other developments.

15.23 Information presented in order to inform an Appropriate Assessment, as part of the HRA process, concludes that the integrity of the Muirkirk and North Lowther Uplands SPA, and all other Natura 2000 designated sites will be unaffected by the Development.

15.24 In addition, enhancement measures in the form of the Regional Hen Harrier Conservation Management Plan, aims to improve the conservation status of hen harriers in south Scotland and to deliver a net benefit to the regional hen harrier population.

#### Cultural Heritage

15.25 During construction of the Development, a **moderate** (significant) direct effect on cultural heritage asset 7 is predicted as a result of access track construction. Implementation of mitigation measures, including marking-off the feature to ensure preservation in-situ will reduce the residual effect to **minor** (not significant). There is also the potential for significant direct effects during construction on unrecorded, buried archaeological remains that survive in areas of construction works, the effects of which are unknown (predicted as **minor/moderate**). However, following implementation of mitigation measures, including issuing construction guidelines to contractors, adoption of an archaeological watching brief (if required) and the recording of any buried remains, residual effects are likely to be **minor** (not significant).

15.26 Whilst the iterative design process has played a key role in minimising effects on cultural heritage assets, it has not always been possible to relocate turbines to avoid intervisibility with all these assets whilst also addressing all other design constraints. On this basis, **moderate** (significant) effects are predicted on the setting of the non-designated Cogshead Farmstead (asset 8) and on Auchengruith Cross Scheduled Monument (SM678) during operation. These effects are also considered to be significant residual effects, although interpretation of the historical associations of Cogshead Farmstead is proposed to enhance the visitor experience. Neither of the significant effects identified on the setting of scheduled monuments is considered to be so great as to affect the ability to understand the setting of the monument.

#### Socio-Economics, Tourism and Recreation

15.27 It is anticipated that up to £3.4 million will be spent locally during construction and that 28 job years will be created resulting in a significant (**moderate**) positive effect. It is also expected that there may be some disruption to users of the Southern Upland Way during construction (resulting in a significant **moderate adverse** effect), although this will be mitigated by the development of an access plan, resulting in a temporary residual effect of **minor** significance.

15.28 NLEI Ltd has agreed to provide community funding of £5,000 per MW, in line with Scottish Government Guidance, which is £5,000 per MW installed capacity per year. As the Development is expected to have a generating capacity of approximately 147MW, this suggests that the annual contribution to the fund will be £735,000. Over the 25 year lifetime of the Development, this will equate to a total of £18.4 million which equates to a **moderate (positive)** effect.

#### Other Issues

15.29 In relation to other issues, the assessment of effects considers technical acceptability rather than following the EIA method of identifying significant effects. On this basis, there are predicted unacceptable aviation and defence effects on the Lowther Hill radar and telecommunication effects on the JRC UHF Link (telecommunications). These effects will be mitigated through technical solutions such that there will be no unacceptable, or EIA significant, residual effects.

#### Interrelated Effects

15.30 The EIA Regulations (Schedule 4, Part 1, paragraph 3) require that Environmental Statements consider the interrelationships between aspects of the environment likely to be significantly affected by a development. It is considered that the following effects are interrelated (these have been captured in the various assessments with the potential for inter-related effects having been considered in the design and in the development of mitigation measures):

- There is a correlation between the sensitivity of viewpoints used for recreation and tourism and the landscape and visual assessment of the Development from these viewpoints, with the assessment of effects in **Chapter 13: Socio-Economics, Tourism and Recreation** relating to the assessment of visual effects in **Chapter 6: Landscape and Visual Amenity**.
- There is some correlation between visual and cultural heritage effects in relation to the change in views resulting from the Development where these are evident from cultural heritage receptors. An assessment of effects on the setting of cultural heritage features is undertaken in **Chapter 10: Cultural Heritage**, which is interrelated with the findings of the assessment in **Chapter 6** whereby changes to views within the wider area are discussed.
- There is some correlation between likely effects on hydrology and on ecology given that changes to hydrology resulting from the Development could result in effects on ecological receptors, for example, disruption of the hydrological patterns within groundwater dependent habitats. These interrelated effects are assessed in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and **Chapter 8: Ecology**. In addition, there are links between effects on ecology and ornithology in relation to the loss or reduction in quality of suitable habitats for breeding, or indirect effects on foraging due to the changes in conditions for prey items. These effects are discussed in **Chapter 9: Ornithology**.
- There is some correlation between potential effects on local residential amenity resulting from visual effects on settlements and individual properties; temporary effects from construction noise and traffic, as well as the potential for operational noise. Effects on amenity are considered in **Chapter 6, Chapter 11, and Chapter 12: Access, Traffic and Transport**.

#### Summary of Significant Effects

15.31 A summary of the predicted significant effects (both positive and negative) associated with the construction and operation of the Development, prior to and post the implementation of proposed mitigation measures, is detailed in **Table 15.1** below.

**Table 15.1: Summary of Significant Effects**

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
<b>Landscape and Visual Amenity</b>			
<b>Construction Effects</b>			
Landscape effects on the Development Area.	Significant (Major)	Follow agreed CMS and/or CDEMP during construction which includes restoration of disturbed areas.	Significant (Major)
Visual effects on viewers within the Development Area.	Significant (major)	Follow agreed CMS and/or CDEMP during construction which includes restoration of disturbed areas.	Significant (Major)
<b>Operational Effects</b>			
<b>Landscape</b>			
Southern Uplands LCT (area between the Crawick Water to the Mennock Pass (which includes the Development Area). Upland Glens LCT (Mennock Pass). Upper Dale LCT (for the Auchentaggart/Sanquhar Moors area to the north-east of the valley floor).	Significant (Major)	None.	Significant (Major)
Southern Uplands LCT (an area north-west of Leadhills including the Snar Water valley, Windy Dod and the Rake Law ridge). Upland River Valley LCT (the Snar Water section). Upper Dale LCT (north facing slopes between Glengenny and Ulzieside).	Significant (Moderate)	None.	Significant (Moderate)
<b>Visual Amenity - Settlements</b>			
Visual effects from Wanlockhead.	Significant (Moderate)	None.	Significant (Moderate)
<b>Visual Amenity - Routes</b>			
Muirkirk to Wanlockhead Drove Road (between Spango Bridge and Duntercleuch Hill). Southern Upland Way (between Lowther Hill and Sanquhar).	Significant (Major)	None.	Significant (Major)

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
Coffin Road.			
A76 and railway along Nithsdale (effects for c.2km between Knockenjig to the edge of Sanquhar). B797 (between Mennock to Wanlockhead). B740 (between Nethercog and Spango Farm). Muirkirk to Wanlockhead Drove Road (from Lamb Knowe to Spango Bridge). Southern Upland Way (between Whing Head and Sanquhar).	Significant (Moderate)	None.	Significant (Moderate)
<b>Visual Amenity – Viewpoints</b>			
VP1: SUW, Glengaber Hill. VP4: Upper Wanlockhead. VP6: Lowther Hill. VP7: Mennock Pass. VP8: Auchentaggart Moor. VP9: Sanquhar GolfCourse. VP10: Crawick Multiverse. VP16: Kelloholm. VP17: SUW, Whing Head.	Significant (Major)	None.	Significant (Major)
VP2: Wanlockhead Beam Engine. VP3: Wanlockhead Museum. VP11: B740, Corsebank. VP13: Crawfordjohn. VP22: Cairn Table.	Significant (Moderate)	None.	Significant (Moderate)
<b>Cumulative Effects</b>			
Operational effect on Southern Uplands LCT (scenario 2). Operational effect on Upland River Valley LCT (scenario 3) – the Snar water section. Operational effect on Upper Dale LCT (scenarios 2 and 3) – Auchentaggart/Sanquhar Moors and Glengenny to	Significant (Moderate)	None.	Significant (Moderate)

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
Ulzieside.			
Operational effects on viewpoints: VP6: Lowther Hill (scenario 3). VP10: Crawick Multiverse (scenario 2 and 3). VP13: Crawfordjohn (scenario 3).	Significant (Moderate)	None.	Significant (Moderate)
Operational effects on routes: A76 and railway – Knockenjig to Sanquhar (scenarios 2 and 3).	Significant (Moderate)	None.	Significant (Moderate)
<b>Hydrology, Hydrogeology, Geology and Soils</b>			
<b>Construction</b>			
Mobilisation of heavy metals; elevating metal levels in surface water quality.	Significant (Moderate)	Competent environmental supervision during construction activities, particularly close to watercourses.  Site-specific mitigation, detailed in <b>Appendices 7.3 and 7.4</b> and <b>Chapter 7</b> , including:  Soil testing to establish natural baseline range in advance of construction including leachate testing, bioavailability assessment and updating of conceptual site model.  Characterisation of all soils and aggregate planned for excavation across the Development Area.  Design of drainage system to control run-off.  Ongoing dialogue with SEPA regarding threshold values and selection of appropriate mitigation and monitoring measures.	Not significant (Minor)

Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
		Increased control methods for excavating at locations with values beyond agreed threshold value.  Micrositing of infrastructure.  Site awareness of potential of interaction with mine workings material, mineral lodes or black shale and ensuring appropriate training and supervision.	
Peat stability failure; causing sedimentation to surface water quality.	Significant (Moderate)	Competent environmental supervision during construction activities, particularly close to watercourses.  Site-specific mitigation at locations of concern, detailed in <b>Appendix 7.2</b> , which will include additional investigation during geotechnical site investigation undertaken prior to construction.  Additional site investigation following forestry removal.  Micrositing of infrastructure.  Ongoing slope stability monitoring.	Not significant (Minor)
<b>Ornithology</b>			
<b>Construction</b>			
Black grouse.	Significant (Moderate)	Pre-construction surveys. 750m construction buffer from leks during particular times.  Best-practice construction (pedestrian restrictions, speed limits).	Not significant (Minor)
Hen harrier.	Significant (Moderate)	Breeding Bird Protection Plan. Pre-construction surveys.	Not significant (Minor)
Merlin.	Significant (Moderate)	500m construction buffer from active nests during particular times.	Not significant (Minor)
Short-eared owl.	Significant (Moderate)	Best-practice construction (pedestrian restrictions, speed limits).	Not significant (Minor)
<b>Cultural Heritage</b>			
<b>Construction</b>			
Direct effect on identified heritage asset of low sensitivity (Asset 7) from track construction.	Moderate	Mark-off enclosure (Asset 7) during construction works to avoid any accidental damage occurring to the remains resulting from construction works in the area (including possible	Minor



Predicted Effect	Significance of Effect	Mitigation	Significance of Residual Effect
		micro-siting of turbine 18). Preservation in situ.	
Direct effects on unrecorded, buried archaeological remains that survive in areas affected by construction works.	Unknown (Minor - Moderate)	If required by planning conditions, an Archaeologist will be appointed to monitor construction activities likely to expose buried remains.  Construction guidelines will be issued to all contractors containing arrangements for calling upon a professional archaeologist in the event of buried archaeological remains being discovered.  Any buried remains or finds will be recorded to approved archaeological standards.	Minor
<b>Operation</b>			
Effect on setting of non-designated asset: Cogshead Farmstead (Asset 8).	Significant (Moderate)	Offset mitigation: Interpretation.	Significant (Moderate)
Effects on setting of Auchengruith earthwork cross (SM678).	Significant (Moderate)	None.	Significant (Moderate)
<b>Socio-Economics, Tourism and Recreation</b>			
<b>Construction</b>			
Local Area construction contribution of £3.4 million and 28 job years.	Significant (Moderate positive)	None.	Significant (Moderate positive)
Disruption to users of the SUW (Sanquhar to Wanlockhead section) and core paths and RoW within the Development Area.	Significant (Moderate adverse)	Implementation of an Access Plan during construction.	Not significant (Minor adverse)
<b>Operation</b>			
Community Benefit Fund of £735,000 annually.	Significant (Moderate positive)	None.	Significant (Moderate positive)
<b>Other Issues</b>			
<b>Operation</b>			
Effect on NATS Lowther Hill Radar.	Significant	Technical mitigation solution.	Not significant
Effect on JRC UHF Telecommunications Link.	Significant	Technical mitigation solution.	Not significant

<sup>i</sup> Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000

<sup>ii</sup> Scottish Government, 2013, Planning Advice Note 1/2013: Environmental Impact Assessment

<sup>iii</sup> Scottish Natural Heritage. (2014). Siting and Designing Windfarms in the Landscape (Version 2)